

## **2. Estimate of Effects on Water Resource & Uses in the Study Area**

Beyond Poorfarm Brook, there are no other surface water bodies that might be impacted by the pumping of the two new production wells. Fortunately, there are no other water users or registered groundwater withdrawals located near enough to the production wells to be impacted by the pumping of the GAVD wells.

### **F. Public Notification (388.11)**

This document is being sent via certified mail to the Town of Gilford, New Hampshire, the municipality where all water is being withdrawn and utilized. The entire study area lies within the Town of Gilford. This fulfills the requirements of Env-Ws 379, 388, and 390. The report will be submitted to:

Department of Planning and Land Use  
Town of Gilford  
47 Cherry Valley Road  
Gilford, NH 03249  
Phone: 603-527-4727

No other active public water supplies lie within the study area established for this submittal.

## **XIII. SPECIFIC REQUIREMENTS TO SATISFY ENV-WS 390: WATER CONSERVATION RULES**

Rule Env-Ws 390 requires that the approval of any new public water supply source triggers adherence with the recently enacted Water Conservation Rules. The specific rules for GAVD are comprised in Env-Ws 390.05, Requirements for Existing Large Community Water Systems.

### **A. Env-Ws 390.10: Application**

The GAVD has addressed the issue of water conservation in a variety of ways prior to the establishment of these regulations. The GAVD feels that some of the requirements of Env-Ws 390.05 will not result in the best means to conserve water. Therefore, under the provision of Env-Ws 390.09, the GAVD is requesting a waiver from sections 390.05 (b) through (h) and (o) of the water conservation rules. The justification for this waiver was prepared by C & C Water Services, the operator of the system, and is included in Appendix F.

Beyond the metering requirements (the subject of the waiver request in Appendix F) the GAVD shall:

- Estimate the volume and percentage of unaccounted-for water in the water system once every year, in accordance with 390.05 (i).
- Prepare and submit a response plan to the NHDES within 60 days if the percentage of unaccounted-for water exceeds 15% of the total volume introduced to the water system (390.05 (j)).
- Implement pressure reduction within one year of obtaining approval of a new water source when technically feasible, consistent with water system industry standards and regulations, and consistent with other public health and safety considerations (390.05 (n)).
- Complete a water conservation educational outreach initiative, using materials prepared by the NHDES (390.05 (p)).

**B. Env-Ws 390.11: Public Notification and Involvement**

This document is being sent via certified mail to the Town of Gilford, New Hampshire, the municipality where all water is being withdrawn and utilized. This fulfills the requirements of Env-Ws 379, 388, and 390. The report will be submitted to:

Department of Planning and Land Use  
Town of Gilford  
47 Cherry Valley Road  
Gilford, NH 03249  
Phone: 603-527-4727

In addition, to fulfill the requirement of Env-Ws 390.11 (a)(2), another copy will be sent via certified mail to:

Lakes Region Planning Commission  
103 Main Street, Suite #3  
Meredith, NH 03253  
Phone: 603-279-8171

A summary of the Water Conservation Rules, prepared by NHDES, will be submitted to each of the governing bodies.

**XIV. LIMITATIONS**

EGGI has collected and evaluated the available technical data according to professionally accepted scientific standards. The recommendations provided herein represent EGGI's professional opinion based upon the data collected and do not constitute a warranty written or implied.

## **XV. REFERENCES**

Federal Emergency Management Agency (FEMA) (1992) Flood Insurance Rate Map (FIRM) for the Town of Gilford, New Hampshire, Belknap County, Community Panel Number: 330004 0015 C.

Lyons, J.B., Bothner, W.A., Moench, R.H., and Thompson, J.B. (1997) Bedrock Geology Map of New Hampshire, New Hampshire Geological Survey Map GEO-1.

## The Case For a Flat Rate Billing System in Gunstock Acres\*

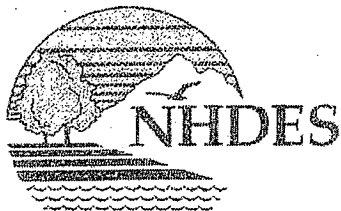
We have a better system in place right now. Installing water meters at all the points of usage would be a step backwards for this community.

1. Geographically, the true cost of supplying water to an area which covers a wide range of elevation is not relative to the amount of water used.
2. Currently the Town of Gilford collects our revenue from the users. We risk losing this tremendous opportunity if we switch to a metered system.
3. Data collected from this system over many years shows clearly that we do not have excessive usage which needs to be curbed.
4. Water lost through leakage is quite minimal because of unique attention and expert leak detection capabilities on the part of our licensed water operator.

Detailed explanation of the summary above:

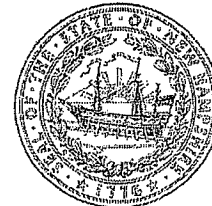
1. Gunstock Acres Village Water District supplies water to approximately 580 service connections. It is primarily residential, with the inclusion of an inn and two restaurants. The community is built on two hills with a year-round brook running down the valley between. The elevation ranges from 600 ft. to 1,350 ft. Clearly, pumping water to the top of the hills costs considerably more than letting water run down to the lowest elevations. A good percentage of the people at the top of the hills are part-timers. So, the infrastructure and the cost of pumping water to the top doesn't get compensated for if we bill by the amount of water used.
2. For over a decade, the Village District has been working in cooperation with the Town of Gilford to provide a simple way to collect revenue from the users. The Village District provides the dollar amounts to the Town, the Town sends out the bills, collects and records the payments, and periodically transfers the collected amount to the Village District. No time is required on anyone's part to read residential water meters. Additionally, no time is required on our part in dealing with delinquent accounts and we never have to send shut-off notices and follow through with disconnection.
3. Data collected shows that the whole of Gunstock Acres uses an average of 170 gpd per service connection, whereas the design average is considered to be two and a half times that. As can be seen from this, our need for additional water supply comes from increased population, not inefficient usage.
4. With magnetic meters we get instantaneous gpm and the meter sends a 4-20 milliamp signal to the CPU that right now is programmed to track gpm at 3 intervals primarily at night at the lowest usage, which gets the operator a day-to-day advantage over leakages. The Commissioners are considering internal or external loggers to track the usage trends better. This, for me as operator, will show the history better, and spot leaks faster. Just having mag meters with medium to large leaks is good, but not as good for the detection of small leaks. Small leaks are better found at night. If we use this system at PS 7 & 1 where we are 75% set up, that covers the whole system (because PS 3 & 6 are on VFD's. Also, the monitoring and loggers would detect flow differences in those zones.) The conclusion is that if the Village District invested its time and money in loggers and associated technology rather than service meters, we can detect problems a lot earlier and then fix them sooner. Waiting three months to do a water audit is a long time to be losing water before you even start looking for it.

*\*Prepared by C & C Water Services*



The State of New Hampshire  
**Department of Environmental Services**

Michael P. Nolin  
Commissioner



July 27, 2006

Daniel Tinkham  
Emery & Garrett Groundwater, Inc.  
56 Main Street  
Meredith, NH 03253

**RE: Large Groundwater Withdrawal Permit Application, Large Community Water Supply  
Gunstock Acres Village District, EPA 0881020, Proposed GAVD-7C & GAVD-7D  
Gilford, New Hampshire**

Dear Daniel Tinkham:

The New Hampshire Department of Environmental Services (NHDES) has reviewed a report titled "Preliminary Hydrogeologic Investigation, Gunstock Acres Village District, Groundwater Development, Production Wells GAVD-7C and GAVD-7D" (Preliminary Application), prepared for C & C Water Services (CCWS) and Gunstock Acres Village District (GAVD) by Emery & Garrett Groundwater, Inc. (EGGI), dated May 22, 2006. CCWS and GAVD are seeking approval of two new community bedrock production wells, designated GAVD-7C and GAVD-7D, both at a rate of 86,400 gallons per day (gpd) for a total additional capacity of 172,800 gpd. The purpose of the two new community bedrock production wells is to supplement the potable water needs of GAVD. GAVD-7C and GAVD-7D are located in the Poorfarm Brook valley 1350 feet north and 950 feet north, respectively, of pumping station 7 in Gilford, New Hampshire.

This letter provides preliminary review comments in accordance with New Hampshire Administrative Rules Env-Ws 379, *Site Selection of Large Production Wells for Community Water Systems*, New Hampshire Administrative Rules Env-Ws 388, *Major Groundwater Withdrawal* and New Hampshire Administrative Rules Env-Ws 390, *Water Conservation Rules*. NHDES records indicate that the Preliminary Application was received May 25, 2006 and that no request for public hearing was received at NHDES during the following 15-day public hearing request period and no comments were received by NHDES during the following 45-day public comment period. NHDES' preliminary comments are below:

1. The Preliminary Application indicates on page 18 that GAVD is requesting a waiver from Env-Ws 390.05 (b) through Env-Ws 390.05 (h) and Env-Ws 390.05 (o) of the Water Conservation Rules, which concern the installation of water meters and the implementation of a water audit and leak detection program. Justification for the waiver request was prepared by CCWS, system operator, and included in Appendix F. The request appears to be based on the use of an alternate

system using loggers installed in various distribution system zones and associated monitoring technology, however, the summary in Appendix F also indicates that this system has not been fully implemented. Provide in the final report further detail of the proposed alternative method, which demonstrates compliance with the water conservation rules; and specifically includes a description of leak detection and repair, quantification of unaccounted-for water, implementation status, and how the proposed method for tracking water loss will technically equate to the requirements of Env-Ws 390.05(b) through 390.05(h) without the installation of private water user meters in accordance with Env-Ws 390.09.

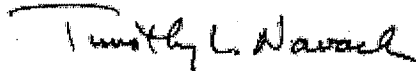
2. NHDES concurs, as described on page 5 and 6 of the Preliminary Application, that the wellhead for GAVD-7C must be completed to an elevation of at least 679 feet above sea level, which is two feet above the estimated 100-year flood elevation of 677 feet above sea level in accordance with Env-Ws 379.05(b).
3. Provide a description of wetlands within 500 feet of the proposed well locations and show the wetlands, if any, on a site plan in accordance with Env-Ws 379.06(j)(4) and Env-Ws 388.07.
4. Provide documentation of legal control of the sanitary protective area (Lot 53-347) in the final report in the form of a recorded deed of ownership or recorded easement as required by Env-Ws 379.06(k).
5. Page 11 of the Preliminary Application states that "there are no known domestic wells within 1000 feet of the new production wells". Provide confirmation that a visual survey was conducted as part of the inventory of water resources and uses in accordance with Env-Ws 388.07.
6. The pumping test program must comply with requirements of Env-Ws 379.11 and Env-Ws 388.09. Any waivers from these requirements need to be obtained from NHDES prior to conducting the withdrawal test to the extent possible.
7. NHDES understands, as indicated on page 13, that the proposed pumping test discharge will be directed into Poorfarm Brook upgradient of the proposed wells and adjacent to pumping station 7. Provide a plan that shows the proposed discharge location of water derived from the existing wells GAVD-7A and 7B, and from the proposed wells GAVD-7C and 7D, during the pumping test program. Additionally, describe how discharge flow rates from wells GAVD-7A and 7B will be measured and reported.
8. The Preliminary Application presents a water budget estimate on page 6. Provide a revised water budget in the final report based on the conceptual hydrologic model condition of 180 days of continuous pumping at maximum volumes without recharge from precipitation or pumping test discharge including an estimate of the volume of flow in Poorfarm Brook and the percentage of pumping volume derived from induced recharge from Poorfarm Brook or captured from the Poorfarm Brook watershed.
9. Provide a description of method to be used to collect the proposed stream gauge measurements of Poorfarm Brook during the pumping test program mentioned on page 14 and how this method will be used to determine flow in Poorfarm Brook. Also provide an estimate of the accuracy of the selected method.

10. Provide a description of the devices proposed to measure discharge flow rates during the pumping test program at the existing wells GAVD-7A, 7B, and at the proposed wells 7C and 7D. Additionally provide calibration documentation of these flow rate measurement devices consistent with manufacturers' specifications in accordance with Env-Ws 379.11(e). NHDES recommends that a backup method to measure discharge flow rates during the pumping test program be used periodically to verify that the primary measurement devices are operating properly.
11. Page 13 of the Preliminary Application indicates that pumping test monitoring locations will include a bedrock well at Pumping Station #1 and a dug well at Pumping Station #5. Provide the anticipated operating schedule for all nearby wells identified in Env-Ws 379.09, including all GAVD wells in the vicinity of Pumping Station #1 and Pumping Station #5, during the proposed pumping test program as required by Env-Ws 379.11(f)(10).
12. Provide New Hampshire Water Well Board well completion reports in the final report for P-1, P-2, P-3, MW-1, and MW-2 in accordance with Env-Ws 379.21.
13. The Preliminary Application on page 12 indicates that GAVD-7C and GAVD-7D will be pumped at a constant rate of 60 gpm each during the one-week pumping period. Provide criteria for pump shut down in accordance with Env-Ws 379.11(f)(12).
14. Page 13 of the Preliminary Application indicates that well monitoring request letters will be sent to owners of area domestic wells and public water supply wells for pumping test monitoring. Provide copies of each well monitoring request letter and confirmation of delivery. An example of a private well monitoring request letter may be found at <http://www.des.state.nh.us/dwspp/access.rtf>. Additionally, NHDES recommends including a water well questionnaire at <http://www.des.state.nh.us/dwspp/waterwellquestionnaire.pdf>.
15. NHDES is strongly encouraging applicants developing new sources of water for community water systems to collect a water quality sample for perchlorate from each proposed new source during the withdrawal test required by the new source approval process. Although law or regulations do not require this, the State or USEPA may adopt standards in the future, and knowing if this chemical is present in a proposed water supply may affect your approach to developing a new source of water. Other states have recently adopted varying health standards for perchlorate in drinking water. Please note that many laboratories do not conduct perchlorate analysis. To assist you in identifying a laboratory that can complete this analysis, the Department refers you to a list of laboratories certified by Massachusetts to complete perchlorate analyses at <http://www.mass.gov/dep/water/drinking/perclab.pdf>.
16. NHDES recommends that the third sample of the pumping test water quality testing program be analyzed for radon in addition to those parameters required to be monitored per Env-Ws 310-316, *Drinking Water Quality Standards*.
17. NHDES requires that water quality analyses be performed by a laboratory which is certified in accordance with Env-C 300, and all analyses shall be performed in accordance with Env-C 300 as stated in Env-Ws 379.12(g).
18. NHDES understands that field chemistry meters will be used to determine dissolved oxygen, specific conductance, temperature, and pH values in discharge water from wells GAVD-7C and

GAVD-7D twice daily throughout the pumping period as indicated on page 15 of the Preliminary Application. In addition, NHDES requires that these same parameters be measured in surface water in Poorfarm Brook twice daily throughout the pumping period, at a location representative of background conditions, to assess possibility of induced surface water recharge to GAVD-7C and GAVD-7D.

If you have any questions about this letter or any other groundwater permitting issues, please contact me at 271-8866 or [tnowack@des.state.nh.us](mailto:tnowack@des.state.nh.us).

Sincerely,



Timothy L. Nowack, P.G.  
Hydrogeologist  
Water Supply Engineering Bureau

cc: Robert Dalton, Commissioner, Gunstock Acres Village District  
Wade Crawshaw, C & C Water Services, (email)  
Stephen Roy, Water Supply Engineering Bureau, NHDES (email)  
Bob Mann, Water Supply Engineering Bureau, NHDES (email)



September 12, 2006

Daniel Tinkham  
Emery & Garrett Groundwater, Inc.  
56 Main Street  
Meredith, NH 03253

**RE: Large Groundwater Withdrawal Permit Application, Large Community Water Supply  
Response to Water Conservation Rule Waiver  
Gunstock Acres Village District, EPA 0881020, Proposed GAVD-7C & GAVD-7D  
Gilford, New Hampshire**

Dear Mr. Tinkham:

The New Hampshire Department of Environmental Services (NHDES) has reviewed a report titled "Preliminary Hydrogeologic Investigation, Gunstock Acres Village District, Groundwater Development, Production Wells GAVD-7C and GAVD-7D" (Preliminary Application), prepared for C & C Water Services (CCWS) and Gunstock Acres Village District (GAVD) by Emery & Garrett Groundwater, Inc. (EGGI), dated May 22, 2006. CCWS and GAVD are seeking approval for two new community bedrock production wells, designated GAVD-7C and GAVD-7D, both at a rate of 86,400 gallons per day (gpd) for a total additional capacity of 172,800 gpd. The purpose of the two new community bedrock production wells is to supplement the potable water needs of GAVD. GAVD-7C and GAVD-7D are located in the Poorfarm Brook valley 1350 feet north and 950 feet north, respectively, of pumping station 7 in Gilford, New Hampshire.

In response to the preliminary application, NHDES provided a review comment letter to EGGI dated July 27, 2006. Comment No. 1 of the letter references a waiver request by GAVD for the New Hampshire Administrative Rule Env-Ws 390, *Water Conservation Rules* pertaining to existing large community water systems that are developing new groundwater sources. Specifically, GAVD is requesting a waiver to those portions of the rule which require installation of water use meters at each user connection (metering program), implementation of a water audit and leak detection program, and adoption of a rate structure that promotes water conservation (Env-Ws 390.05(b) – (h) and (o)). CCWS included a justification for the request in Appendix F of the preliminary report.

Since the July 27 letter, CCWS has provided further detail on the system's current protocol for tracking water loss and some of the equipment currently used in pump station No. 7. Additionally, CCWS has clarified to NHDES the manner in which a leak detection program is triggered by pump station meter readings. CCWS has also indicated that GAVD is looking into expanding the water loss tracking

program system-wide, to the system's other pump stations, once the proposed GAVD-7C & 7D are brought online.

A summary of NHDES's current understanding of GAVD's water system and water loss tracking program is follows:

- The system is serviced by three pump stations, numbered 1, 5 and 7.
- Pump station No. 7 is served by three groundwater wells (GAVD-7, 7A & 7B) and houses the system's atmospheric storage tanks.
- Wells GAVD-7, 7A & 7B are equipped with electronic water meters (a.k.a. magmeters) which sample instantaneous volumetric flow rate on a programmed interval.
- CCWS has equipped the control unit for pump station No. 7 with a datalogger capable of recording flow rate (from at least one meter) over a programmed interval.
- Generally, CCWS has used the flow rate records from a low-use period (commonly late night / early morning) to establish a "baseline" water use rate for the system.
- Downloading and post-processing the flow rate record from the datalogger is conducted manually and is not performed on a fixed schedule.
- A leak detection program is initiated when, during the low-use period, an anomalous increase in water use above historic baseline observations occurs and is sustainable for a few days.

In that the current approach to water use tracking enables the system operator to respond quickly to a potential problem in the distribution system, NHDES believes it shows promise for use in lieu of a conventional metering program; however, NHDES can not complete its review of the waiver request without additional information on the proposed alternative. Specifically, the proposed alternative needs to serve as the basis for a water conservation program for the system, whereby instrumentation of the entire system is used to collect and record water use data and this data is subsequently reviewed on a schedule and used to initiate leak detection program if necessary. In addition, the program must track the results of leak detection and water use tracking, and report the results to NHDES to demonstrate compliance with the rules. Examples of supporting information include:

- A detailed description of the components used to measure and record water use including instrumentation specification sheets indicating measurement accuracy and manufacturer-suggested calibration intervals for all meters used;
- A schedule for installation and/or upgrade of existing facilities and each pump station with the instrumentation necessary to carry out the water use recording program;
- A description of the method and frequency that the flow rate will be recorded and the schedule on which recorded measurements will be reviewed;
- A description of how "baseline" water usage value(s) will be quantified and assigned, and the factors that affect the dependability of the "baseline" value (i.e. seasonality);
- A description of how the trigger value, above the "baseline" value, will be assigned and how it will be used to initiate a leak detection program;
- A description of leak detection program procedures;

- An estimate of the accuracy of the "baseline" approach and a comparison to the water audit/unaccounted-for water estimate requirement in the rule (i.e. 15% in accordance with Env-Ws 390.05(j));
- A description of how the system will quantify the volume of unaccounted-for water annually to comply with follow-on reporting requirements to NHDES on a 3-year basis [NHDES example tracking and reporting form for water conservation compliance is attached for your review]; and
- You have also requested a waiver from Env-Ws 390.05(o) pertaining to a unit price basis for water use rates. Please provide a detailed description of adaptations or alternatives to GAVD's current water rate structure that would be implemented to promote water conservation in accordance with the intent of the rules. (Note, a discussion of Water Conservation Incentives Through Rate Structuring for public water supplies can be found on NHDES' factsheet titled *Implementing a Water Efficiency and Conservation Program for Public Water Utilities* [<http://www.des.state.nh.us/factsheets/ws/ws-26-9.htm>]).

If you have any questions about this letter or any other groundwater permitting issues, please contact me at 271-3918 or [sroy@des.state.nh.us](mailto:sroy@des.state.nh.us) or Tim Nowack at 271-8866 or [tnowack@des.state.nh.us](mailto:tnowack@des.state.nh.us).

Sincerely,

Stephen Roy, P.G.  
Water Supply Engineering Bureau

cc: Robert Dalton, Commissioner, Gunstock Acres Village District  
Wade Crawshaw, C & C Water Services, (email)  
Bob Mann, NHDES (email)  
Derek Bennet, NHDES (email)

Encl: Copy of Water Conservation Rule compliance tracking form

From Wade - in response to Steve Roy letter of 9/12/2006

1 All flow meters will be Magnetoflow Mag Meter (MMM) made by Badger Meter Co. The MMM has output signals. The first is a 4-20 mA signal that corresponds to instantaneous flow and has a pulse signal that will allow a CPU (central processing unit) to totalize.

Transducers are used for pressures in the system and for determining water levels in the wells. A clock in the CPU will be used to tie everything together and also to derive graphs using the totalizers.

A dial up (telephone) or Internet system will be used to transfer signals from PS (pump station) 1, 3, 5, 6, 7 to PS7 or other location where a PC would be. The appropriate CPU cards and software translate signals from the meters, transducers and CPU's to a PC so spreadsheets can be used for analysis. A touch screen will be at the PS which enables the operator to see exactly what's occurring in the PS.

We have all the meters, some of the CPU's and transducers. The communication components have not been purchased at this time.

With all these parameters being recorded, - flow, totalizer, clock, pressure and well level, - there will be a lot of trending and comparisons to graph; and when a change happens (a leak) it will show up.

2 The schedule for installation of these instrumentation should be within a year of well approvals.

3 The flow rate will be recorded a minimum of every 15 minutes along with pulse for totalizing, system pressures and static levels of wells. Most likely it will be recorded continuously, non-stop.

A weekly schedule will be established to download and make hard copy for study, or when needed. The touch screens will be there for quick checks.

4 Baselines are now manually being recorded for zone 1, the largest zone. The baseline is established by flow rates from 1 am to 3 am and by watching the changes of the maximum and minimum in 3 time slots 12-1, 1-2, 2-3. Maximum and minimum flows are always different each night and from day to day. If you get low flow numbers, or even a zero, during 1 hour you have a pretty tight system. The need to continually check every hour is because people are continuously using water, just not where near the frequency that they do other times of the day. Once you get a low flow, you can safely deduct that there is no leak.

Some variables that affect night usage are: homeowners running water to prevent freezing during the winter months, and lawn watering during the summer months. The drawbacks that these activities create can be addressed through public education.

5-6 trigger values We have different trigger values for different leaks:

Large leaks 40-500 gpm. No sophisticated equipment is needed to detect these. You know it as soon as you walk into the station. (Or likely before this because somebody has called saying they have no water at their house or that somebody - police, highway department, residents - reported water running down the road). The sequence of events to use are visual checks of roads and surrounding areas, valving for isolation, and sound equipment between the isolated valves.

Medium leaks 8-40 gpm show up in the touch screen very well because of the indication of higher than normal flows at night. If there is nobody out of water or experiencing low pressure, we will do a visual and fix it if something is found and then see what changes in the night flows. If the night flows remain consistently more than normal but nothing has been visually detected, then we'll start valving. In 80% of the distribution system, we can isolate the sources by distribution valving. Recording flows at these steps allow us to determine which source is feeding the leak. The process of elimination leads us to the leak between two valves (and all this time, we haven't put anyone out of water). Then we use sound equipment. If it's not consistent, the flow may involve a human factor to investigate.

Small leaks 1-8 gpm These are problematic; these are the ones the new equipment are for.

Example: If we determine a zone has a night baseline minimum of 0-7 gpm and a max of 10-25 gpm over 3 one-hour intervals and then consistent over weeks and at the same time the daily flows are low, then we see min 5-12 and max 15-30 and stays consistent, good chance we have a leak. This leak is much harder to find. If it stays consistent at least past a weekend or two, so transient people can find a leak in their home, then sometimes you see a consistent flow drop off without doing anything.

A small leak needs more visual attention to driving roads, checking driveways, foundation drains, embankments, and listening to homes.

Straight valving might work on the smaller zones 3 and 4; but on the larger zones, if we use the method described for medium leaks, isolating the sources needs more time for it to show up and so, more patience. Leaving valves closed for extended periods of time, waiting for changes to become detectable, is not a favorable approach for the straight valving. However, the new equipment recording with graphs can demonstrate changes in trends which alert us to which source the water feeding the leak is coming from. This technology gives us a quicker view into changes with these valving techniques.

7. For the first year or so, we would need to establish these figures with all the parameters involved so that GAVD has a good number for total volume to derive the 15% from in order to make sure that the total volume for a year which the baseline is derived from does not have a leak included in it. When leaks occur during the year, estimates of water lost will need to be made and deducted. All that considered: Example: If GAVD can show trends of the use of water going to below 8.85 gpm at a point in time in winter months and 13.5 gpm in summer months, then GAVD would be in the 15% rule on a daily basis. Calculations are as follows:

Winter use 85000 gpd x 15% = 12,750 gpd = 8.85 gpm

Summer use 130,000 gpd x 15 % = 19,500 gpd = 13.5 gpm

On a quarterly or yearly basis, multiply the gallons per day by the numbers of days in the period.

Concerning the accuracy, I feel that with all these parameters in place it could be as accurate as hundreds of mechanical source and service meters (which are each subject to dirty screens, mechanical failure, and aging).

8 Source meters: no problem. But with no service meters the % lost will be a function of minimum flow. For example: minimum flow = 6 gpm = 8,640 gpd = 518,400 gpd (gallons per quarter). And if that is less than 15% of the total volume we have met the rules. The spread sheet

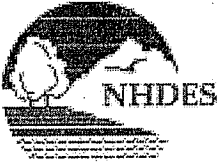
data will have to add all that info. This will have the 15% rule on a daily to quarterly to yearly basis.

9 It is the intent of GAVD to keep the billing the same as it has been: flat rate. In the past, there was a lot of consideration for billing homes based on how expensive it is to pump the water up the hill, the difference being the number of pump stations the water has to go through. We also considered metering only sprinklers. With all the discussions that we had about changes, the billing never ended up being fair, and all the scenarios would cost everyone more, a lot more. So GAVD has left the flat rate alone.

GAVD is continuing to invest in recording equipment for flows, pressures, totalizer and well levels which cost approximately a quarter of what service meters would cost, with no where near the level of maintenance needed afterwards, and recognizes leaks much faster than reading service meter quarterly and still meet the 15% rule.

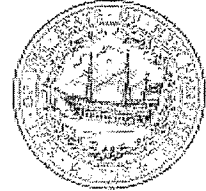
10 Lawn restriction measures of odd and even days used alternatively between Mountain Dr. and Sagamore Rd. (the two mountains) have been used in the past when necessary (or at least most prudent) and can continue to be used.

This development is not opposed to conservation measures at all. The fact remains that it has clearly demonstrated this fact.



The State of New Hampshire  
**DEPARTMENT OF ENVIRONMENTAL SERVICES**

Thomas S. Burack, Commissioner



March 2, 2007

Wade Crawshaw  
C&C Water Services  
56 Main Street  
Meredith, NH 03253

**RE: Large Groundwater Withdrawal Permit Application, Large Community Water Supply  
Response to Proposed Water Conservation Plan  
Gunstock Acres Village District, EPA 0881020, Proposed GAVD-7C & GAVD-7D  
Gilford, New Hampshire**

Dear Mr. Crawshaw:

The New Hampshire Department of Environmental Services (NHDES) has reviewed a document submitted by C&C Water Services dated February 15, 2007. The document was submitted as a draft response to questions raised by the Department in a letter dated September 12, 2006 from Stephen Roy to Daniel Tinkham relative to a waiver request from Env-Ws 390.05 (b) – (h) and (o). The purpose of this letter is to provide comments and seek clarification on each of the items in the document submitted by C&C Water Services.

1. **Instrumentation:** C&C Water Services proposes to use Magnetoflow Mag Meters (MMM) made by Badger Meter Company in each of its pump stations. Provide meter model number(s) and include specification sheets indicating accuracy, flow range, and meter calibration schedule.
2. **Installation Schedule:** C&C Water Services proposes to install instrumentation within one year of final well approvals.
3. **Review Frequency:** C&C Water Services proposes to record flow rates, system pressures and static water levels at a minimum of every fifteen minutes. C&C Water Services also proposes to download and review the data at least weekly.
4. **Baseline Quantification:** C&C Water Services proposes establishing baseline flows by reviewing minimum and maximum night flows from 12am to 3am. Considering night flows may vary, explain how many nights will be used to quantify a baseline. Please also explain how many baseline flows will be calculated for each zone (quarter, season, month, year). Explain how C&C Water Services will ensure that baseline quantification does not include water that may be leaking from the system. Please provide public education documents that will be distributed to homeowners to address night usage variables. Describe the frequency in which baseline flows will be recalculated and/or adjusted for growth in the number of system connections.
5. **Leak Trigger Values:** C&C Water Services outlined leak trigger values of 40-500, 8-40, and 1-8 gallons per minute (gpm) for large, medium, and small leaks, respectively. Clarify if these are flows above the calculated baseline or straight readings from the

DES Web Site: [www.des.nh.gov](http://www.des.nh.gov)

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pump station meter(s). Please describe the period of time that flows above the baseline need to occur in order for C&C Water Services to begin leak location activities.

6. **Leak Detection Procedures:** C&C Water Services uses visual inspection, isolation valves, and listening surveys to isolate leak location following detection. Please provide an updated system distribution map including zones and isolation valves. Clarify the time schedule C&C Water Services proposes for leak repair. Explain why a few strategically placed zone meters would not assist operating staff in detecting/locating small (1-8 gpm) leaks.
7. **Accuracy of Approach:** C&C Water Services proposes using water use trends to determine when unaccounted-for water exceeds 15%. Please explain how trends are determined and quantified. Clarify if trends are solely a function of low night flows or night flows in excess of baseline flows. Please clarify how often trends will be calculated and reported to the Department to ensure compliance with Env-Ws 390.05 (i) – (m).
8. **Unaccounted for Water Requirement:** C&C Water Services proposes calculating percent water lost by comparing minimum flows with total volume. Minimum flows may include actual usage. Please explain why using minimum flows is more appropriate than using the minimum flow above the baseline aggregated across all zones.
9. **Rate Structure:** C&C Water Services proposes to maintain the current flat rate structure as service meters will not be installed. Please describe other initiatives that will be implemented to encourage water conservation among consumers.

If you have any questions about this letter or any other water conservation issues, please contact me at 271-6685 or [dbennett@des.state.nh.us](mailto:dbennett@des.state.nh.us).

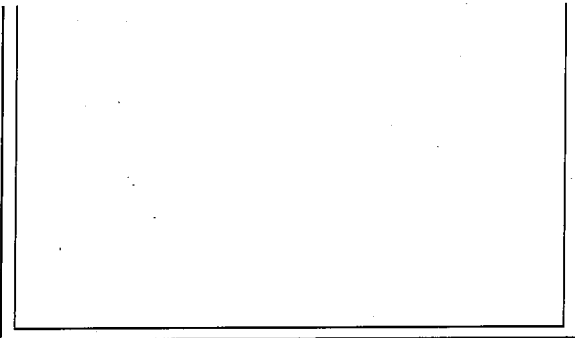
Sincerely,



Derek S. Bennett  
Program Manager – Water Conservation  
Drinking Water and Groundwater Bureau

cc: Stephen Roy, Water Supply Engineering Bureau, NHDES (email)  
Tim Nowack, Water Supply Engineering Bureau, NHDES (email)  
Daniel Tinkham, Emery & Garrett Groundwater, Inc. (email)





March 7, 2007

Derek S. Bennett  
Program Manager - Water Conservation  
Drinking Water and Groundwater Bureau  
NHDES

**RE: Water Conservation Rules Env-Ws 390  
Supporting Information  
Ref. DES letter from Derek S. Bennett, March 2, 2007**

Dear Mr. Bennett:

This is a response to your letter, providing additional information as requested.

1. See enclosed copies of pertinent information from "Installation & Operation Manual" of a Magnetoflow Mag Meter (MMM).
2. The schedule for installation of these instrumentation will be within a year of well approvals.
3. Yes.
4. Two baselines are defined as: Summer - May 15 - Sept. 15 and Non-summer - Sept. 16 - May 14. We have a baseline for each zone and a total baseline for all zones combined. To establish a baseline, a year will be needed to work out proper parameters and to establish that no leaks are occurring at the time we establish that baseline. There are 4 zones to monitor. Zone 1 is supplied by the three source fields: Pump station 1 with a 3-inch MMM, pump station 5 with a 2-inch MMM, and pump station 7 with a 3-inch MMM. Besides these meters, there are 6 other 2-in. MMM; one for each of the 5 wells at PS 7 and 1 additional 2-in. MMM at PS 7 which is used to measure the water that gets bypassed the fluoride removal system. In zone 1, pump station 7 will be used most of the time at these low flow times because the MMM is supplied by a hydropneumatic tank and not directly by the booster pumps. Zone 2 has a 2-in. MMM off the VFD booster pumps. Zone 3 has a 2-in. MMM off the VFD booster pumps. Zone 4 is in a transition between on/off boosters and VFD boosters. The 2-in. MMM is just before the water leaves the PS so it is after the VFD and hydropneumatic tank. In all these cases, the baseline flow will be established in conjunction with the other parameters i.e. system pressure differential, well static levels and total flow. The baseline may be reestablished as system growth dictates. The public education will be distributed in the CCR's and as needed,. They usually go out in May or June, which is timely for this issue because it is the beginning of the lawn watering season (which is the biggest culprit of altering early morning flow). The subject in that material would be: #1, not using discretionary water between 12 and 4 a.m. (lawn watering, dish washing, garden watering), #2, the freezing business - running water to prevent freezing - and #3, the use of

sensors on their automatic lawn sprinkling i.e. rain sensor, ground moisture sensor, or anything else that would stop needless and excessive watering.

5. These flows are above the baseline previously established. The period of time that increased flow occurs before leak detection activities begin are as follows: within 3 days for a 40-500 gpm increase, within 2 weeks for an 8-40 gpm increase, and 3 weeks for a 1-8 gpm increase.

6. To find the leak, the water system elects to conduct a comprehensive leak detection survey, water system shall complete the survey in accordance with procedures and protocols described in chapters 3 and 4 of the "Manual of Water Supply Practices, Water Audit and Leak Detection" document identification # AWWA M36, American Water Works Association, 1999. The water system shall repair all leaks identified by the activities mentioned above within 60 days of discovery unless a waiver is obtained in accordance with Env-Ws 390.09.

7. Unaccounted-for water is nighttime lowest use above baseline. These trends will be calculated weekly and reported to DES monthly.

8. We're going to use minimum flows above baseline.

9. We will publicize what we are doing for the users' benefit and work with the commissioners to write their own localized conservation plan and warrant articles to establish water conservation.

Sincerely,

Wade Crawshaw  
C&C Water Services, Inc.